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## CLAIMS

1. A gene encoding a protein that catalyzes biosynthesis of piperitol and/or sesamin.

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2. A gene encoding a protein that catalyzes a reaction forming a methylene dioxybridge in pinoresinol and/or piperitol.

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3. A gene encoding a protein that catalyzes biosynthesis of piperitol and/or sesamin, and that consists of (a) an amino acid sequence of SEQ ID NO: 1, 64 or 78, or (b) an amino acid sequence that has been modified by substitution, deletion, insertion, and/or addition of one or more amino acids of SEQ

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ID NO: 1, 64 or 78.

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4. A gene encoding a protein that catalyzes biosynthesis of piperitol and/or sesamin, and that consists of an amino acid sequence which is at least 50% homologous to an amino acid sequence of SEQ ID NO: 1, 64 or 78.

5. A gene including a base sequence of SEQ ID NO: 2, 65 or 79 as an open reading frame region.

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6. A gene encoding a protein that catalyzes biosynthesis

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of piperitol and/or sesamin, and hybridizing under stringent conditions with (a) a polynucleotide consisting of a base sequence of SEQ ID NO: 2, 65 or 79, (b) a polynucleotide encoding a protein consisting of an amino acid sequence of  
5 SEQ ID NO: 1, 64 or 78, or (c) a fragment of the polynucleotide (a) or (b).

7. A gene as set forth in any one of claims 1 through 6, which is derived from sesame.

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8. A protein encoded by a gene as set forth in any one of claims 1 through 7.

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9. A protein catalyzing biosynthesis of piperitol and/or sesamin, and consisting of (a) an amino acid sequence of SEQ ID NO: 1, 64 or 78, or (b) an amino acid sequence that has been modified by substitution, deletion, insertion, and/or addition of one or more amino acids of SEQ ID NO: 1, 64 or 78.

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10. An antibody that recognizes a protein as set forth in claim 8 or 9.

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11. A recombinant expression vector including a gene of any one of claims 1 through 7.

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12. A transformant comprising a recombinant expression vector including a gene of any one of claims 1 through 7.

5           13. A producing method of a protein, comprising the steps of:

          incubating or growing a transformant of claim 12; and  
          obtaining from the transformant a protein that catalyzes  
biosynthesis of piperitol and/or sesamin.

10           14. A plant, its offspring, and a tissue of the plant and its offspring, into which a gene of any one of claims 1 through 7 has been introduced.

15           15. A producing method of piperitol and/or sesamin, comprising the step of using a gene of any one of claims 1 through 7, or a protein of claim 8 or 9.

20           16. A producing method of a transformant containing a large amount of lignan, comprising the step of using a gene of any one of claims 1 through 7.

25           17. A producing method of a plant containing a large amount of piperitol and/or sesamin, comprising the step of using a gene of any one of claims 1 through 7.

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18. A producing method of a transformant containing a small amount of lignan, comprising the step of using a gene of any one of claims 1 through 7.

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19. A producing method of a plant containing a small amount of piperitol and/or lignan, comprising the step of using a gene of any one of claims 1 through 7.

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20. A method of cultivating sesame, comprising the step of using a gene of any one of claims 1 through 7.

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21. A gene detecting device comprising a polynucleotide probe whose base sequence is at least part of a base sequence of a gene set forth in any one of claims 1 through 7.